Adv. Physics 1st Semester Test Review Guide

Unit 1 - What is Physics and The Mathematical Toolkit

- *Key Terms*

physics	hypothesis	accuracy
precision	theory	scientific method

- Know the fundamental units used in physics.
- Know how to find the slope and equation of a line on a graph.
- Know the basic relationships that are observed between variables in equations and what the graphs of those relationships look like. (Ex: Direct, Inverse, and Quadratic)
- Compute the velocity of an object given a displacement vs. time graph
- Compute the acceleration of an object given a velocity vs. time graph
- Know how to convert between common units of distance, time and speed. (Ex. km to m, minutes to seconds, m/s to mi/hr)

Unit 2 - Kinematics

- *Key Terms*

distance	displacement	velocity
speed	acceleration	acceleration due to gravity
vector	scalar	

- Explain the difference between a vector and a scalar and identify examples of vector and scalar quantities.
- Compute the acceleration of an object given a velocity vs. time graph.
- Compute the total distance traveled and total displacement of an object given the individual displacements.

Unit 3 - Projectile motion

- Key terms

Projectile Motion	Range	Trajectory

- Know the vertical acceleration of an object in projectile motion.
- Know the vertical velocity of a projectile at its maximum height.
- Know how the initial and final vertical velocities of a projectile compare.
- Know the horizontal acceleration of an object in projectile motion.
- Know what happens to the horizontal velocity of a projectile as it moves.
- Know how to find the total time in air of a projectile when given the time to the max height.

Unit 4 and 5 - Forces & Angled Forces

- *Key Terms*

force	equilibrium	inertia
friction	static friction	kinetic friction
weight	coefficient of friction	Normal force

- Know Newton's three laws of motion.
- Determine the direction of the frictional force when given the direction of motion.
- Be able to identify forces given a free body diagram
- Know the difference between static and kinetic friction
- Draw and label all the forces that act on an object on an incline plane.
- Draw and label all the forces that act on an object being pulled at an angle.

Unit 6 - Momentum

- *Key Terms*

momentum	impulse	conservation of momentum

- Determine the effects of mass and velocity on the amount of momentum an object has.
- Determine how force and time are related when changing an object's momentum.
- Compute an object's momentum given its mass and velocity.
- Know in what type of collisions momentum is conserved and not conserved.
- Know what happens to the velocity of an object after it collides with another object.

Unit 7 - Work, Energy, and Power

- *Key Terms*

energy	kinetic energy	potential energy
elastic potential energy	gravitational potential energy	work
spring constant	work energy theorem	power

- Explain the relationship between velocity and kinetic energy.
- Explain what happens to the energy of an object as it rolls down a frictionless inclined plane.
- Explain the relationship between work, power, and time.
- Compute the work done given the force and distance moved.
- Know the difference between positive and negative work.

Name _____ Date _____
Teacher _____ Period _____

Adv. Physics 1st Semester Final Exam Written Review

Answer all questions in the space provided. Show all work. NO CREDIT WILL BE GIVEN IF WORK IS NOT SHOWN.

1. A car with an initial speed of 12.6 m/s accelerates at a uniform rate for 5.6 s to a final speed of 24.8 m/s.
   a. What is the acceleration of the car? **($a = 2.18\ m/s^2$)**

   b. Over what distance does this acceleration occur? **(d= 104.7 m)**

2. A 0.150 kg marble moving 1.48 m/s rolls off the top edge of a 1.25 m high table.
   a. How long was it "in flight"? **(t= 0.51 s)**

   b. How far from the base of the table did it strike the floor? **(d= 0.756 m)**

3. It takes a 15 N force to get a 3 kg plastic box moving across a wood floor. It only takes a 10 N force to keep the box moving at a constant speed. What is the coefficient of static friction and the coefficient of kinetic friction? **($\mu_S = .51$; $\mu_K = .34$)**

4. A 53 kg box moves down an incline at a constant velocity. The incline makes a 28^0 angle with the horizontal.
   a. Calculate the $F_\perp$ and $F_\parallel$. **($F_\perp$ = 458.6 and $F_\parallel$= 243.8)**

   b. What is the net force acting on the box? **(F_{NET} = 0 N)**

   c. What is the force of friction on acting on the box? **(F_f = 243.8)**

   d. What is the coefficient of friction between the box and the incline? **(μ = .53)**

5. A 1350 kg car moving east at 7.0 m/s collides with a 2250 kg truck moving east at an unknown speed. The vehicles stick together and move east as a unit after the collision at a speed of 5 m/s.
   a. What is the kinetic energy of the car before the collision? **(K= 33075 J)**

   b. Find the velocity of the truck before the collision. **(v= 3.8 m/s)**

6. Matthew pulls his little sister, Sarah, in a sled on an icy, horizontal surface (assume no friction), with a force of 60.0 N. The force is applied along a rope at an angle of 37.0^0 upward from the horizontal.
   a. If Matthew does 575 J of work how far did he pull his sister, Sarah? **(d= 12 m)**

   b. If Matthew exerts 150 W of power will pulling his sister, how long did it take to mover her across the lake? **(t = 3.83 s)**